

Simple and suited: Guidelines for workplace travel surveys

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ABSTRACT

A growing number of workplaces are adopting Travel Plans to reduce the impacts generated by car trips by their employees and visitors. Many of these plans have been supported by travel demand management programs by transport agencies in Australia and New Zealand. Measuring travel behaviour is important to gauge the effectiveness of these plans and programs.

This paper reports on a review of workplace travel survey methods undertaken for the TravelSmart Workplace program in Western Australia to address limitations such as low response rates and potential bias and identify good practice guidelines. The review recommended ways that workplace travel surveys can be simple and suited to provide useful data within limited resources.

Six guidelines for workplace travel surveys are described:

- Surveys for measuring travel to and from a workplace should be kept distinct from surveys that seek input on interventions to change behaviour
- Survey methods and sampling design should be suited to the survey purpose and nature of the workplace, making preliminary planning a critical initial step
- Random based sampling methods should be used in large populations, whereas a census with effort to maximise response could be used in smaller workplaces

- In determining sample size, the need for sufficient size for valid repeated cross sectional surveys to measure change over time should be considered
- Survey methods and questions used in a workplace before and after a Travel Plan is implemented should be consistent to enable valid comparison of data
- Survey methods and questions should be tested before wide application to check that they generate robust data can meet survey needs.

1. INTRODUCTION

Managing travel demand through behaviour change is an important response to the impacts of car-dominated transport in our cities. These impacts include the private car's contribution to climate change and local air pollution, the use of fossil fuels and exposure to oil supply changes, physical inactivity and traffic congestion. Enabling people to use alternatives to the car for more of their trips is a common feature of metropolitan transport and land use strategies (see for example ARTA 2007, NSW Department of Planning 2005, Queensland Department of Infrastructure and Planning 2008, WA Planning Commission 2004).

1.1 Work-related travel demand management

Work-related travel (i.e. commuting and business trips) accounts for about 20% of personal trips in our cities and more like 40% of all car kilometres travelled (Data Analysis Australia 2008, NSW Transport Data Centre 2008). Work-related travel is important because it is a major component of the peak period traffic that strains the urban transport network. Furthermore, this pressure on transport infrastructure often leads to the creation of more road capacity, which in turn, can generate more private vehicle traffic over time (Goodwin and Noland 2003).

Programs to support travel demand management in workplaces have developed in major cities in Australia and New Zealand, usually from transport and environmental agencies, since the late 1990s. Several use Travel Plans (also called green transport plans) as the framework for engaging workplaces in enhancing and encouraging the use of travel alternatives like public transport, cycling, walking, telecommuting and carpooling. A workplace Travel Plan is a package of actions implemented by an employer or site manager to influence travel behaviour of employees, clients and visitors. By reducing car travel, Travel Plans are designed to improve health and wellbeing (more physical activity, less pollution), reduce demand for car parking (and even free up the land for other uses), improve the employer's standing (corporate social responsibility), gain environmental accreditation and reduce impacts on the local community and environment.

Through a Travel Plan an employer or site manager can be proactive in influencing travel choices of their staff and visitors. Typical actions that are included in Travel Plans include promoting travel alternatives, holding walking and cycling challenges, improving workplace cycle facilities, buying pool bicycles and enabling teleworking. Some organisations also offer incentives to use green modes, change car parking management to discourage car commuting and offer guaranteed rides home as a safety net for green commuters.

1.2 Importance of measuring change

Measuring travel behaviour is important to gauge the effectiveness of these plans and programs. Travel surveys have been used to understand travel generated by a workplace and

to measure change in behaviour after a Travel Plan has been adopted. Concern about the soundness of travel survey methods and reliability of survey data for assessing behaviour change prompted a review of survey methodology. The review reported here was initiated by the TravelSmart Workplace program in Perth, Australia, though it has wider application.

This paper outlines what the review involved and discusses guidelines for workplace travel surveys.

2. REVIEW OF SURVEY METHODS USED IN WORKPLACE TRAVEL PLANS

In 2006, a study of TravelSmart projects around Australia identified shortcomings in survey methods in workplace initiatives (RED3 2006). These issues included sample sizes that were too small to indicate change, self-selected samples that were not representative, not accounting for variability in travel behaviour, and lack of information in survey reports on the methods used.

In 2007 a review was undertaken to address the concerns raised in the RED3 study along with issues identified from local experience with the TravelSmart Workplace program in Perth. The review aimed to identify practical survey methods that will enable reliable results for workplace travel planning and for the evaluation of travel behaviour change stimulated by workplace Travel Plans. This paper is the subject of that review.

The review considered current survey practice and the literature on workplace travel survey methodology and was aimed at developing guidelines for improvement. The steps in the process were:

- a study of survey needs and literature on workplace travel survey methods
- an appraisal of survey methods used in state/territory based TravelSmart workplace projects in Australia, particularly in the WA program, and
- the development of good practice guidelines.

TravelSmart workplace programs have supported a range of organisations to develop Travel Plans including local councils, state government agencies, hospitals, universities, small to large businesses and not-for-profit organisations. The review covered all standard survey methods employed in the workplace Travel Plan programs.

Key findings on survey practice are outlined in Section 3 and the primary guidelines for improving workplace travel surveys are then discussed (Section 4). The primary guidelines are already being applied progressively in the TravelSmart Workplace program in Perth. We have therefore reported some of the challenges encountered in putting them into practice as part of Section 4.

3. CURRENT SURVEY PRACTICE

A similar approach to workplace travel surveys is reported across all workplace Travel Plan programs running in Australia and New Zealand. It consists of:

- A baseline survey which is undertaken early in the development of a Travel Plan to provide information on current travel behaviour. The baseline survey gives a 'before Travel Plan' picture of travel, informs selection of Travel Plan measures, and allows benchmarking against other workplaces to judge potential for change.

- Evaluation surveys are undertaken some time after a Travel Plan has been adopted and implemented to enable an assessment of change in travel behaviour since the baseline survey.

Most workplace travel surveys attempt a census of employees at a workplace, and in the case of universities, students as well. Online questionnaires are commonly used, usually via a survey tool provided by the state, territory or regional government's Travel Plan program. Printed questionnaires have been used in some cases, e.g. where employees do not have ready access to computers and the internet. Surveys are often used as both a measurement technique and as a way of promoting a sustainable travel initiative. Response rates in surveys in Australian workplace Travel Plan programs average between about 30 and 50%.

Common questions cover the employee's home suburb, the methods of travel between home and work usually used or used on specified days, the reason for using those methods and demographic questions such as age and gender. Most surveys also ask about employee interest in changing modes used for commute trips and what alternatives would be considered. Some include questions about barriers to using travel alternatives and potential measures to enable use of these alternatives. Questions about business trips, including methods of travel and destinations, are raised in some surveys.

Analysis of survey results is usually limited to reporting frequency of responses. The evaluation of behaviour change frequently involves a simple comparison of key indicators such as the solo car commuting mode split before and after a workplace Travel Plan is adopted. Weighting of sample data using population data is not commonly used. The significance of change is rarely tested. Problems posed by this approach include:

- Small and self-selected samples may be a source of bias – revealed behaviour may not be representative of the workplace population
- Small changes in travel behaviour observed in travel surveys may be due to bias in survey methods or variation in small samples
- Mixing objective questions about current behaviour with questions about interest in change and how change could be promoted may bias who participates – and hence the results.

Other researchers have also stressed that the fundamental principles of evaluation and statistical methods should be applied in monitoring travel behaviour change initiatives including workplace Travel Plans (Higgins & Johnson 1999, Sullivan & Percy 2008). The review therefore highlighted the need to improve survey practice by providing more robust ways of measuring the impact of Travel Plans and the programs that support them.

4. SURVEY GUIDELINES

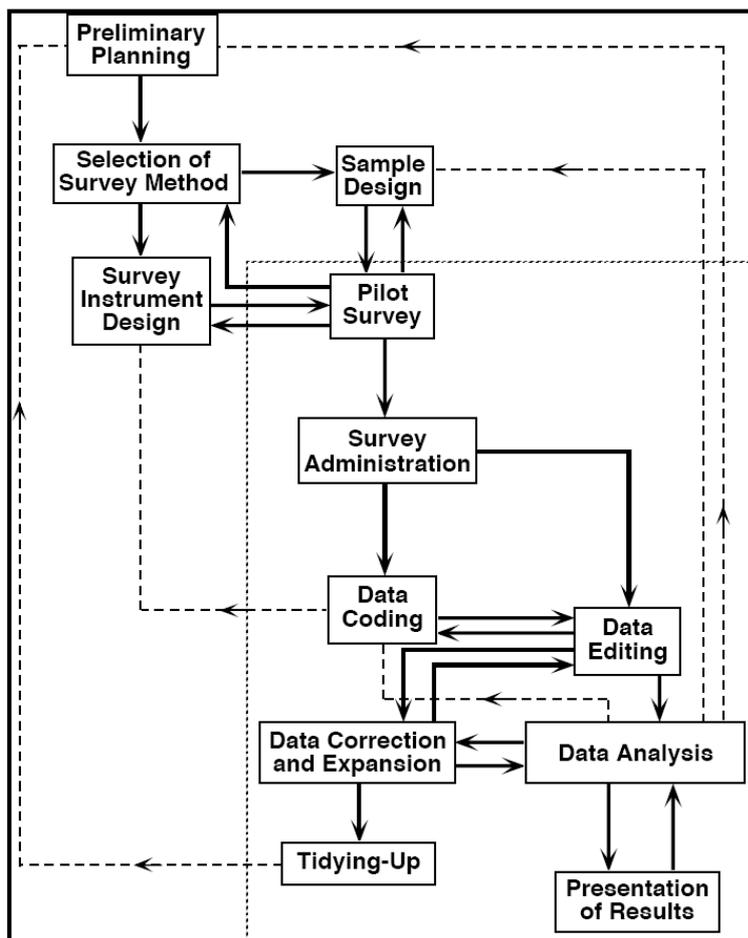
The key guidelines recommended by the review were:

- Different survey instruments or approaches should be used a) for measuring current travel behaviour and b) for seeking employee input on things that would assist them to change behaviour and ideas for Travel Plan initiatives
- Survey methods and sampling design should be suited to the survey purpose and nature of the workplace, making preliminary planning a critical initial step (see Figure 1).

- Random based sampling methods should be used in large workplace populations (e.g. 1,000 plus such as universities and hospitals), whereas a census with effort to maximise response could be used in smaller workplaces
- In determining sample size, the need for sufficient size for valid repeated cross sectional surveys to measure change over time should be considered
- Survey methods and questions used in a workplace from survey to survey should be consistent to enable valid comparison of data, including the same core questions and holding the survey at the same time of year
- The survey process is complex and requires all of the stages shown in Figure 1 to be undertaken. In particular, it is therefore essential to pilot test the survey methods and questions to check process, interpretation of questions by potential participants, and that survey data can meet survey needs.

Each of these guidelines is discussed in turn below.

Figure 1. Survey process



Source: Richardson et al. (1995).

4.1 Measuring or consulting – keep them distinct

Surveys designed to measure travel to and from a workplace should be kept separate from surveys that seek employee input on Travel Plan measures. Mixing questions about how

people travel now with what would enable them to travel differently is likely to bias who responds and how, especially if the survey is promoted as being about reducing car travel and increasing 'green commuting'. There is a risk that car drivers who are not considering changing will not see the point of participating, whereas those interested in making changes to their behaviour or who may benefit from potential Travel Plan measures may be more motivated to take part. Mixed purpose surveys may introduce bias and compromise the representativeness of the sample (Groves et al. 2004).

Surveys to measure whether travel behaviour has changed (i.e. to measure the effectiveness of a behaviour change program) should be as rigorous as is feasible. Seeking input from employees, clients or other visitors to a workplace is a different task and can be done in many ways, only one of which is a survey. Methods could include stakeholder workshops, a suggestion box, focus groups or discussion at staff meetings.

In choosing a method to understand ways to facilitate change, the practical issue of whether the target group may feel 'over surveyed' should be considered. Using a non-survey method, such as obtaining comment through existing forums, may help overcome this perception. In addition, the baseline survey of travel behaviour should be undertaken before seeking staff or client/visitor feedback so that it provides a true 'before' measure. There is also the option of shared survey results with the target group to elicit feedback about how to change the travel patterns seen in the survey data.

4.2 Matching methods with purpose

The survey method needs to match the purpose of the survey. This should be considered in detail during the Preliminary Planning phase (Figure 1). The survey method/s (including sampling design – see Section 4.3) need to be chosen with several key factors in mind - the purpose of the survey, who is to be surveyed and the characteristics of the workplace. This differs from the current state of practice which is to use a one-fits-all approach.

More specifically, considerations in determining survey methods include:

- What is the primary purpose of the survey and what are the key indicators? Is it to measure change in the distance travelled by car in a Travel Plan focused on reducing the corporate carbon footprint, or is it to assess change in active travel in a Travel Plan focused on employee health? In the first the key variable is likely to be kilometres travelled, while in the second focus is on walking and cycling trips (see Table 1). The purpose and indicators will decide whether a survey should cover employee commuting, business trips made by employees and all travel to and from the workplace including clients, suppliers and other visitors.
- What is the size and nature of the workplace to be surveyed? Factors that should be taken into account include:
 - The number of employees and clients or other visitors will determine the choice of survey method possible (see Table 1)
 - The structure of the workforce (e.g. number of people who work 'normal' hours vs. shifts, number of people who have access to a computer) will help to determine choice of survey instrument
 - The number and type of access points to the site will determine whether intercept surveys are an option

These points will also affect what type of sampling process is appropriate (Section 4.3).

- How much data needs to be gathered? Is it limited to mode of access/departure, is data on trip origin/destination needed or are questions more complex? This then leads to questions of whether it is best handled through brief interview or self-completion questionnaire or a computer-based survey (see Table 1).

Many workplace travel surveys have focused on mode split; however, kilometres travelled can also be an important indicator, especially if the objectives of program managers and participating workplaces are to assess the effect on transport carbon emissions. Sullivan & Percy (2008) discuss methods for estimating kilometres travelled for work-related trips, including using GIS with online surveys which allows for likely routes to be used in estimating distance and emissions.

Table 1. Matching survey methods with purpose

Survey Objective	Survey Method – likely variations by size of workplace ¹
<p>Measure employee commuting</p> <p>To measure kms before and after for trips to and from work</p> <p>To measure no. of car-alone before and after for trips to and from work.</p> <p>To measure all modes to and from work – before and after</p>	<p>Small – self-completion, intercept or personal interview may work best. Attempt census to address limitations of a small population (e.g. ask travel over longer period) (choose 1 method only)</p> <p>Medium – any except for phone and intercept; consider different methods for different workers (e.g. trades, cleaners, office workers). Consider phone follow up to increase response rate</p> <p>Large – any except for phone; consider different method for different workers (e.g. trades, cleaners, office workers). Consider methods to increase response rate</p>
<p>Measure all travel generated by workplace</p> <p>To measure kms before and after for all trips generated by the workplace</p> <p>To measure car-alone trips for all travel generated by the workplace – before and after</p> <p>To measure all modes for all travel generated by the workplace – before and after</p>	<p>Small – any, but needs to include business travel for workers. More complicated data collection. Probably need a week’s worth of data for a small no. of people to get variability.</p> <p>Visitors – intercept, though method depends on situation</p> <p>Medium – as above for commute trips, but may need different method for business travel.</p> <p>Visitors – likely intercept, but method depends on situation.</p> <p>Large – as above for commute trips, but may need different method for business travel.</p> <p>Visitors – likely intercept, but method depends on situation</p>
<p>Understanding needs of people to plan workplace action</p> <p>To understand what measures would help make these changes</p>	<p>Small - staff meeting discussions, opportunity for personal comment. Conversations with visitors</p> <p>Medium - Workshops, focus groups, allow personal ideas through champion/s. Discussions or face to face interviews with visitors</p> <p>Large - Workshops, focus groups, allow personal ideas through champion/s. Discussions or face to face interviews with visitors</p>

Adapted from Sinclair Knight Merz (2007c).

¹ We have not defined small, medium and large workplaces as the method depends on the practicality of administration rather than the precise definition of size.

Table 2. Workplace travel survey methods

Survey method	Description	Sampling design	Considerations
Intercept	Questions asked at point of movement or activity, e.g. at workplace entry points. Usually a brief interview	Census or systematic sample	Need discrete access points/routes. Can achieve a snapshot of travel generated by a site. Needs to be brief, so few questions can be asked.
Personal interview survey	Interviewer administers survey at workplace, e.g. ask employees at their desks.	Census or random-based sample	Can achieve a high response rate. Labour intensive. Potential interviewer bias.
Self-completion	People complete printed or online questionnaire.	Census, random, stratified random	Low cost. Risk of low response rates, use promotion and reminder regime to maximise response.
Telephone survey	Contact and ask questions by telephone.	Census, random, stratified random	Need phone list to use as sampling frame. Most suited to office based workforce.

Adapted from Sinclair Knight Merz (2007c).

4.3 Sampling design

As noted, the appropriate sampling method will vary depending on the size of the workplace. Random sampling-based methods should be used in large populations, e.g. 1,000 or more people such as universities and hospitals, whereas a census with effort to maximise response could be used in smaller workplaces.

Random sampling offers a way to seek a representative cross section of the target population, and it can limit survey costs (by reducing the amount of data and so time for collection and analysis). However, random-based sampling may only be feasible for workplaces with a large workforce or client/student population. The main reason for this is that a relatively large number of people need to be surveyed to detect the small changes in travel behaviour likely from survey to survey.

Practical issues in random sampling for workplace travel surveys include gaining access to an accurate sampling frame and ability to select a random sample from it – this can raise privacy and practical concerns in some organisations. How the sample can be contacted should also be considered, e.g. email or by post, and whether appropriate population data can be obtained so the sample and population can be compared and data weighted. For large, complex populations, e.g. hospitals (where the workforce includes nursing and medical staff, support services and administration) stratified random sampling should be considered to seek a representative cross section (travel patterns may vary with the different working hours,

including time of day, and residential locations of these groups, and this may affect their capacity to change their travel patterns).

For small workplaces it is likely that a large proportion of the workforce or client population would need to be asked in order to obtain robust and representative data on travel behaviour. Given the requirements for a random sample a census can be a better approach or the only option.

For both random sample surveys and censuses, obtaining a high response is important. Participation can be maximised through a promotional effort before and during the survey period and a reminder regime to prompt people who have not completed the survey to take part (some survey software allows automated reminders to non-respondents).

4.4 With sample size, think ahead

To assess the impact of a Travel Plan, surveys should be ongoing so change in travel behaviour can be monitored over time (at least for the duration of the plan, say annually over three years). Samples need to be of sufficient size for valid repeated cross sectional surveys to measure change over time; therefore, the appropriate sample size should be considered when designing the baseline survey.

Many Travel Plans aim for a relatively small change in travel behaviour, for example a 5% reduction in solo car commuting within two or three years. Detecting this small change can require that a relatively large proportion of the population be sampled. The sample size will also be affected by the anticipated response rate – based on previous surveys at the workplace or at similar workplaces. If a modest response rate of say 40% is assumed, then a large sample may be required (redundancy built in to account for the low response). A sample size calculator can be used to compare the influence of different assumptions on sample size.

4.5 Be consistent if you want to compare

All Travel Plans need a ‘before’ and ‘after’ survey to measure whether the targeted changes have been achieved. This means that survey methods need to be consistent, including repeating core questions and holding the survey at the same time of year to avoid the effects of seasonal variations. This will avoid or minimise the risk that observed change is simply a result of differences in questions or on how or when the survey was run. Another factor that surveys could address is change in employees’ family responsibilities, such as having a child. The careful design of the initial survey at a workplace, and documentation of the methods used will aid consistent administration and analysis of surveys over time.

An example serves to illustrate this point. A local council surveyed its works depot employees in summer one year when its Travel Plan was being drafted. A follow-up survey was held the following year in winter. A large increase in car commuting was observed, most probably due to seasonal differences between the two surveys.

4.6 Test it out

The literature (e.g. Richardson et al. 1995, Stopher and Stecher 1993) is clear that pilot surveys are vital to ensure that all processes involved in the survey design and implementation have been tested.

The compatibility of population data with sample data and the ability to use these in analysis and weighting of the results should also be tested. Pilot testing provides a way of trying out the elements of the survey with a subsample so that problems can be identified and rectified before wide scale application. This helps to ensure that useful data is collected and assists with maximising the response.

5. DISCUSSION

In our experience, many people involved in promoting, developing and implementing workplace Travel Plans have limited statistical knowledge and skills. Our review of current survey practice showed shortcomings that can be addressed, in part, by applying the guidelines for workplace travel survey methods outlined here. Building awareness of these issues and supporting the use of these guidelines can raise the standard of workplace travel surveys.

Travel demand management for workplaces is relatively new. Travel surveys are important to inform the development of effective workplace Travel Plans and for the evaluation and evolution of programs supporting this activity. Travel surveys should be designed to provide robust statistical data, within the limited resources available. This makes preliminary planning important so that appropriate methods and sampling design are chosen. We believe there is merit in developing a common framework to allow for evaluation and development of workplace programs across jurisdictions (RED3 2006).

The ideal statistical design is difficult to achieve, e.g. it is hard to use control groups and there are challenges applying random sampling when workplace populations are small. This means that it is important to understand the principles behind sampling so that when alternative measures are necessary they are the best options in the circumstances (Sullivan & Percy 2008).

Evaluation of workplace Travel Plans should not be limited to workplace travel survey results (Higgins & Johnson 1999). Other indicators should be considered such as car parking counts, counts of bicycles parked on site and changes to workplace facilities, policies and practices after a Travel Plan is adopted. This combination of data should prove useful in assessing the impact of workplace Travel Plans and advancing their use to support sustainable transport in our cities.

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